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Laparoscopic Radical Prostatectomy – Analysis of Our First 100 Consecutive Cases

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A B S T R A C T

The aim of this study was retrospective study of our first 100 consecutive cases of prostatic cancer, operated by laparoscopic approach and comparison with 100 cases of open retropubic radical prostatectomy (RRP) at our department, focusing on operative data and morbidity. From June 1999 to August 2003 we have performed first consecutive 100 laparoscopic radical prostatectomies (LRP), all according to Montsouris technique. In this study we have compared the results with 100 patients who underwent from May 1997 to August 2003 open RRP. Mean operative time was shorter after RRP (155 vs. 234 min, p = 0.018). Mean blood loss was significantly lower in LRP group (446 vs. 710 ml, p < 0.001). Mean catheter duration time (6.4 vs. 10 days, p < 0.001) and hospital stay (8.6 vs. 11 days, p < 0.001) were significantly shorter in LRP group. There was no statistically significant difference in complication rate in both groups (p = 0.139). Laparoscopic radical prostatectomy is a safe procedure for the patient and complications do not appear more often than in the open operation. In LRP we detected shorter mean catheter duration time, shorter hospital stay and less blood loss. This procedure demands perfect knowledge of the laparoscopic operative technique and due to long-term learning curve, the procedure could be done only in particular centers, where exist suitable equipment and also experienced operators in laparoscopic technique.

***Key words**: prostate, laparoscopy, prostate cancer, operative technique*

Introduction

During the last few years the laparoscopic radical prostatectomy has become to its clinical confirmations. Schuessler et al. made the first description of the procedure in 1992[1]. The same group of authors reported in 1997 their experience with

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the first nine operated cases[2]. According to their opinion, due to many problems, the laparoscopic radical prostatectomy could not be an alternative to the open procedure.

Guillonneau et al. published in 1998 the results of the laparoscopic radical prostatectomy, which were comparative with the standard operation[3]. The same group of authors analyzed in 1999 the results of 65 operated patients[4]. They described their technique of the transabdominal approach – the Montsouris technique. Main characteristics: the procedure starts with insertion of 5 trocars, after that the seminal vesicles are prepared and then the apex of the prostate. The hemostatic suture is placed on the venous plexus and after that they prepare the base of the prostate. Next the bladder neck is cut and the posterior side of the prostate to the apex is prepared. After cutting the urethra, the urethrovesical anastomosis is made and specimen is removed with endobag.

Rassweiler et al. published in 1999 the operative technique, which is called by them the Heilbronn technique and is quite similar to the operative technique of the standard open retropubic radical prostatectomy[5]. Their results on series of 100 and some months later on 180 patients were published in 2001[6–8]. In the operative procedure they use 6 trocars, two assistants who cooperate beside the operator and also the robot AESOP 3000 which responds to the operator´s voice and controls the endocamera. In the first 60 patients they used 5 ports, later followed by 6. The described technique is similar to the open procedure. They start at the apex of the prostate with incision of the endopelvic fascia, followed by division of the puboprostatic ligaments. After the ligature of the venous complex the urethra is cut and seminal vesicles and base of the prostate are prepared. Then follows the urethrovesical anastomosis.

Based on the experience of both groups as also on the experience of Partin et al.[9] and Guillonneau et al.[10], pelvic lymphadenectomy should be performed in case when prostate specific antigen (PSA) value is above 10 ng/ml, Gleason score above 6. On the Congress of the European Association of Urology in Birmingham from 23 to 26 February 2002, the special discussion was dedicated to the problem of indications for laparoscopic radical prostatectomy, but without final conclusion.

On our urological department we use the Montsuoris technique of LRP. In the following text we analyze the operative procedure, the intraoperative and postoperative complications, as well as other results of the 100 operated patients. We present operative technique in various phases of operation with special focusing on technical problems and intraoperative complications, as well as early oncological results and functional outcome. Furthermore we analyzed problem of urinary continence. We were also focusing on learning curve of procedure as one of very sophisticated laparoscopic procedure. The results of both LRP and RRP group were compared.

Material and Methods

Patients

On our Urological department the first LRP was done in June 1999 and till August 2003, 100 consecutive patients were operated. The average age of patients was 62.6 years (51 to 72). Indications for the operation were the same as those we used for RRP-clinically localized prostate cancer, age below 70, PSA under 20 ng/ml and negative bone scan – which was performed in case of PSA above 15 ng/ml. In RRP group average age was 63.1 years (54 to 72). Preoperative characteristics of LRP and RRP groups are shown in Table 1.

TABLE 1
PREOPERATIVE CHARACTERISTICS

	LRP	RRP	
Number of patients	100	100	
Mean age (years)	62.6	63.1	ns
Mean PSA (ng/ml)	8.7	12.4	p = 0.057
Mean Gleason score	5.4	6.3	p = 0.289

The clinical stage of the disease was estimated on the basis of clinical examination, total serum PSA, transrectal ultrasound (TRUS), Gleason score[11] and the transrectal prostate biopsy under ultrasound guidance.

In order to make a comparison between LRP and RRP, we compared first 100 consecutive laparoscopic procedures (LRP group) with 100 open classic procedures, performed at our department between May 1997 and August 2003 (RRP group). Number of procedures performed by year, are shown in Table 2.

TABLE 2
NUMBER OF PROCEDURES PER YEAR

Year	LRP	RRP
1997	/	19
1998	/	23
1999	9	15
2000	16	14
2001	22	11
2002	27	10
2003	26	8

Since the beginning with LRP we have laparoscopically operated all patients in whom we planed radical prostatectomy, except those who were on preoperative check found to have higher overall perioperative risk – ASA ≥ III according to American Society of Anesthesiologists Physical Class System. The results, which were assessed, are not influenced by these different preoperative factors.

Surgery

In the evening before the operation the patient receives the antithrombotic prevention with low molecular Heparin. We do not use an antibiotic prophylaxis. The patient is put in a dorsal supine position on a flat operative table, with his leg apart. Due to the position during the operation, when the patient is relatively strongly inclined on the head, it is necessary to place a special support for shoulders, which should be well loaded to avoid a nerve injury. After the usual operative field preparation, a Foley catheter is inserted. After a radial infraumbilical incision, a Veress needle is inserted in the abdominal cavity for insuflation of CO_2. When the pressure 12 mm Hg is reached, the primary 10-mm trocar is inserted for passage of the 0-degree laparoscope.

The next step is inspection of the abdominal cavity and after that we put the patient in a Trendelenburgs position with a decline of 30 degrees. Then four other trocars are inserted- one 5-mm trocar into the iliac fossa on the right side, between this and the umbilicus the second- 10 mm trocar. On the left side on symmetrical positions remaining two 5-mm trocars are inserted. The surgeon stands on the left side of the patient, the first assistant on the right side and the second assistant, who controls the camera, stands at the patients head. The operative nurse stays on the left side of the operator.

First step of the procedure is freeing the seminal vesicles with incision of pos-

terior bladder peritoneum along the peritoneal arch, then identifying and sectioning the vas deferens and proceeding with dissection along it to access the seminal vesicles. In the space between seminal vesicles and the prostate base, the Denonvilliers fascia is cut. After this incision the prerectal fat tissue can be identified. For easier identification of rectum wall, a metallic sound is inserted in rectum. In case of there is an indication for pelvic lymphadenectomy, the procedure is performed according to the usual technique[12]. The urinary bladder is filled then with 150 ml of saline and the peritoneum is incised at the fundus of the bladder. Next the Retzius space is entered and the anterior side of the bladder and prostate are prepared till the apex. The endopelvic fascia is exposed and incised on the line of its reflection, and then the puboprostatic ligaments are incised, in order to expose the dorsal venous complex. The venous plexus is ligated with resorbable 2-0 sutures and cut. After that the base of the prostate and the bladder neck are prepared. Usually it is not easy to define the edge between the base of the prostate and the neck of the urinary bladder. Here we help ourselves with a balloon of Foley catheter, which is pulled, to identify the bladder neck. By doing this, the edge between prostate base and balloon of the catheter comes out. Now there follows the preparation of the prostate in the channel between the base of the prostate and the balloon of the catheter. So it is possible to preserve the integrity of the bladder neck. After cutting the urethra on the bladder neck, the preparation of the base of prostate is finished and the vesicles are pulled forward. On the level of the Denonvilliers fascia the preparation of the posterior side of the prostate is made. The prostate is detached from rectum and sometimes it is necessary to insert in rectum metallic sound for identification of rectum wall.

The urethra is cut at the level of verumontanum and the specimen is temporarily placed in the iliac fossa. Next the urethrovesical anastomosis is made with 6 to 8 interrupted resorbable 2-0 sutures. The first is placed posteriorly at six o'clock, following others clockwise toward 12 o'clock on both sides. Before suturing the anterior side of the anastomosis, the catheter is inserted. After suturing the anastomosis, the bladder is filled with 150 ml physiological solution in order to find out if the anastomosis is watertight sutured. Through the left sided 5-mm port we insert then the suction drain and place the specimen into endobag in order to remove it through the enlarged right sided 10-mm port, depending of the size of specimen. The procedure is finished with closure of skin incisions.

Postoperative care

During the hospital stay patients receive antithrombotic prophylaxis with 5000 units of low molecular Heparin once a day. An antibiotic therapy is given only in case of signs of inflammation. On the operative day patients receive Pyritramide by a patient controlled analgesic pump (PCA), later Diclofenac is usually sufficient, if necessary at all. All patients get up on the first day after surgery and they start to consume liquid diet; on the second postoperative day they receive light diet. The drain is usually removed between second and third postoperative day. If there is no urinary secretion, the catheter is removed between the fifth and the seventh day after the operation. The PSA control is carried out three weeks after the surgery, at the first postoperative check.

The continence is controlled immediately after removing the catheter and later on after each following controlling examination, on the basis of simple questionnaire and usage of pads. Three months later, on the second postoperative

check, the patients are first questioned also about possibility of erection.

Patients who underwent RRP were all operated according to the usual technique, described by Walsh et al.[13].

All patients in the study were operated at our institution, by three surgeons, all experienced in laparoscopic surgery. From 1992, when we started with laparoscopy, till our first LRP, all together have performed more than 2000 laparosopic procedures. Preoperative preparation and postoperative management were the same in both groups, except of management of postoperative pain before June 1999, when we used classic intravenous administration, after that we used the PCA in both groups.

Results

Operative results, complications and postoperative data are shown in Table 3.

Mean operating time of the whole LRP series, including also the patients with pelvic lymphadenectomy (23%), was 234 minutes (160 to 345), as it is shown in Figure 1. It depended on local condition (possible fatness, scars, inflammation and fibrous changes around the prostate) and on eventual lymphadenectomy (mean specific time 35 minutes, ranging 25–55). Mean operative time in RRP group was 155 min (80–175).

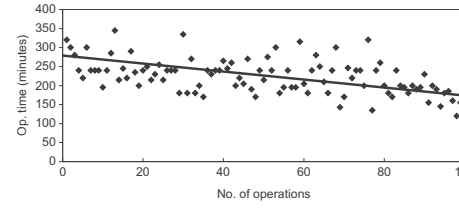

Fig. 1. Operative time chart.

Mean preoperative PSA value in LRP group was 8.7 ng/ml (1–22.3). In RRP group was mean preoperative PSA 12.4 ng/ml (1.3–21). In 34 patients (34%) a neoadjuvant hormonal therapy was given. This small number does not allow us any conclusions, as some authors have done[15,16].

In the LRP group the mean intraoperative bleeding rate was 446 ml (35 to 2200). Forty seven (47%) operated patients received their own blood. In 3 cases (3%) we had to make a conversion to the open procedure because of technical problems (anatomic situation, fatness, extensive intrapelvic scars). In 5 patients (5%)

TABLE 3
OPERATIVE AND POSTOPERATIVE DATA AND COMPLICATIONS COMPARISON

	LRP	RRP	p-value
Number	100	100	
Operative time (min)	234 ± 41.4	155 ± 32.6	0.018
Blood loss (ml)	446 ± 166	710 ± 239	<0.001
Rectal injury	1	1	
Ureteral injury	1	2	0.139
Bladder injury	3	2	
Conversion	3	/	
Early reintervention	2	2	
Mean catheter duration time (days)	6.4 ± 3.06	10 ± 5.3	<0.001
Hospital stay (days)	8.6 ± 2.61	11 ± 4.15	<0.001
Analgesic use (days)	1.8 ± 0.9	4.2 ± 1.9	<0.001

we experienced intraoperative complications. In 3 cases a small injury of the urinary bladder, which were immediately discovered and treated laparoscopically. In one patient there was a rectal injury (our first patient), which was discovered on the second postoperative day and resolved with open operation, in one case we had an injury of the left ureter, which was immediately discovered and treated laparoscopically with suturing over an internal stent.

After surgery we had 2 revisions (2%). In one patient because of the before mentioned rectal injury and in one case a laparoscopic reoperation on the day of operation was successfully performed because of an excessive postoperative bleeding. In 2 patients we had a urinary wound secretion, which ceased spontaneously. In RRP group we experienced also 5 intraoperative complications, one rectal injury, two minor ureteral injuries, two bladder injuries and two early reinterventions due to a heavy bleeding. The amount of complications in both groups was practical the same, there was no statistical difference. On the second postoperative day majority (70%) patients in LRP did not need parenteral analgesics, since pain was scored 2 or less by Visual Analogue Scale.

One third (36%) of the patients had a positive surgical margin. It is important to emphasize that in the LRP group the clinical stage of disease in all cases did non correspond to the pathological stage.

TABLE 4
LRP – PATHOLOGICAL RESULTS

Pathological stage	No. pts	Positive surgical margins
pT2a	28	4 (14%)
pT2b	21	5 (24%)
pT2c	37	17 (46%)
pT3a	7	5 (71%)
pT3b	7	5 (71%)
Total	100	36 (36%)

Three months postoperatively only eight patients (8%) had minimal stress incontinence. No patient died immediately after the operation or during the postoperative period or till now (max. 5 year follow up). In one patient we had to make an incision of a stenosis of the urethrovesical junction 1 year after operation.

In the LRP group the mean intraoperative bleeding rate was 446 ml (35 to 2200). Forty seven (47%) operated patients received their own blood. In 3 cases (3%) we had to make a conversion to the open procedure because of technical problems (anatomic situation, fatness, extensive intrapelvic scars). In 5 patients (5%) we experienced intraoperative complications. In 3 cases a small injury of the urinary bladder, which were immediately discovered and treated laparoscopically. In one patient there was a rectal injury (our first patient), which was discovered on the second postoperative day and resolved with open operation, in one case we had an injury of the left ureter, which was immediately discovered and treated laparoscopically with suturing over an internal stent.

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Discussion

Radical prostatectomy of the localized prostate cancer is the only method, which makes possible a complete recovery of the patient. In spite of many complications which may occur, such as the excessive bleeding, the injury of adjoining organs, especially rectum, high rate of impotence, in some cases the incontinence, stricture of the urethrovesical anastomosis, it is still the best method of therapy for localized disease. The most frequently used operative technique is the classic radical retropubic approach. Recently also the radical perineal prostatectomy is popularized, but in many cases has to be preceded with an open or laparoscopic transperitoneal lymphadenectomy. According to the trends of last five years toward minimal invasive operative methods, LRP has become the most frequently used method of radical prostatectomy in many urological centers, above all in Europe. Since the initial presentations of Guillonneau and Valancien, then Rassweiler and Abbou, a lot of patients were operated by this method[4,8,10,17]. French authors developed a transperitoneal approach described by Kavoussi, Schuessler and Guillonneau[1,2,10]. According to this method, the first approach is toward vas deferens and seminal vesicles. The next step should be the access to Retzius space by incision of peritoneum at the fundus of the bladder. After cutting endopelvic fascia and puboprostatic ligaments, ligation of the venous plexus, follows then a preparation of the prostate base and after cutting the bladder neck, preparation of the posterior side of prostate to the apex. At the level of the verumontanum the urethra is cut and then an urethrovesical anastomosis is created. According to Montsouris Institute this approach was named the Montsouris technique. We always used this operative technique.

The average operating time in our hands was 234 min. Guillonneau and Valancien reported 239 min as their average operating time, performing also the lymphadenectomy in 30% of patients, providing in these cases 30 minutes more[4]. Rassweiler reported 271 min as his average operating time, performing the lymphadenectomy in 90% of the operated patients[8].

Although our series is small, the average operating time is comparable. For radical prostatectomy we have the same inclusive criteria as Guillonneau and Valancien[4].

The bleeding rate in LRP group was relatively low (446 ml in average) and significantly lower, than in case of our RRP series. About half of our patients got a transfusion in spite of small blood loss and almost in all patients we gave their own blood, as also some other authors mention[8,10,17]. Our patients mostly received their blood intraoperatively, and exceptionally during the first two postoperative days only, similar to Goldschlag et al[19]. According to some reports these patients could have higher haemoglobin rate at the moment of discharge from the hospital[8,10,19].

One of the more important demands of LRP is to suture the urethrovesical anastomosis appropriately. The urinary catheter was in our series removed at the beginning on the seventh postoperative day, but in the majority of last cases, on the fifth postoperative day, as also with majority of other authors[8,10]. Some of the authors reduced catheterization time even to 3 days[17,18]. In our first 50 cases we did not perform a cystography before catheter removal. Although we had not experienced urinary leakage we perform now cystography routinely. On the other hand, Suto reported about 28.6% cases of urinary secretion[20]. Overall, the trend is to remove the catheter as soon as possible[21] and immediately after that to dis-

charge the patient from the hospital. Earlier removal certainly demands an exact creation of the anastomosis.

The very important point is also the positive surgical margin rate. In our patients it is relatively high (36%). It could be partly explained by understaging. Other authors reported much lower rates: Guillonneau and Valancien reported 19% of positive surgical margin rate in the whole series, Abbou with collaborators reported 27.9% positive margin on the material where 88% operated patients had pT2 tumor[17], Rassweiler's group[8] published 17% cases with positive margin (2.3% at stage pT2), finally, Turk and associates published their experience with 152 operated patients with 23.4% positive surgical margin rate[22].

One of the significant postoperative complications is also a stricture on the plane of the urethrovesical anastomosis. In our series we had only two (2%). Other authors report similar rates[8,13].

Conclusion

Laparoscopic radical prostatectomy is a minimal invasive operative method giving the patient certain advantages. With operative and postoperative complications, who appear not frequently, patients get up earlier, there is less postoperative pain, and the possibility of the exact suturing of the anastomosis enables removal of the catheter earlier after surgery and all this shorter hospital stay. In our series the functional results were better than in case of standard radical prostatectomy.

Laparoscopic radical prostatectomy demands a perfect laparoscopic operative technique. The learning curve is slow and long and it is not possible to expect to be performed by all urologists and at all urological departments. The procedure can only be performed by very experienced teams in the laparoscopic operative technique, in particular centers. Three surgeons at our department have been performing laparoscopic operations for 11 years and the laparoscopic radical prostatectomy is become our method of choice for the localized prostate cancer.

With better preoperative assessment, treatment and better patient's preparation for the procedure, one can expect even better results. The operative time could be further reduced, as well as duration of postoperative catheterisation and with a time the rate of positive surgical margins will be lower.

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LAPAROSKOPSKA RADIKALNA PROSTATEKTOMIJA – ANALIZA PRVIH 100 OPERACIJA IZVEDENIH U OPĆOJ BOLNICI »SLOVENJ GRADEC«

S A Ž E T A K

Cilj ovoga rada bila je retrospektivna studija prvih 100 uzastopnih slučajeva prostatičnog karcinoma operiranih laparoskopskim pristupom i usporedba sa 100 slučajeva operiranih otvorenom retropubičnom radikalnom prostatektomijom (RRP) u Općoj bolnici »Slovenj Gradec«, s posebnim osvrtom na operativne podatke i morbiditet. U razdoblju od lipnja 1999. do kolovoza 2003. godine izveli smo naših prvih 100 laparoskopskih radikalnih prostatektomija (LRP), sve izvedene Montsouris-ovom tehnikom. U ovoj studiji uspoređivali smo rezultate sa 100 pacijenata koji su bili operirani od svibnja 1997. do kolovoza 2003. godine otvorenom RRP. Srednje vrijeme trajanja operacije bilo je kraće u RRP grupi (155 nasuprot 234 min, $p = 0,018$). Srednja vrijednost gubitka krvi bila je signifikantno niža u LRP grupi (446 nasuprot 710 ml, $p < 0,001$). Srednje vrijeme kateterizacije (6,4 nasuprot 10 dana, $p < 0,001$) i boravka u bolnici (8,6 nasuprot 11 dana, $p < 0,001$), bilo je signifikantno kraće u LRP grupi. Nije bilo statistički signifikantne razlike u interoperativnim komplikacijama u obje grupe ($p = 0.139$). Laparoskopska radikalna prostatektomija je sigurna metoda za pacijente i komplikacije se ne događaju učestalije nego kod otvorene operacije. Kod LRP grupe smo uočili kraće srednje vrijeme kateterizacije, kraći boravak u bolnici i manji gubitak krvi. Ova metoda zahtijeva odlično znanje laparoskopske operativne tehnike i tijekom dužeg učnog razdoblja metoda se može izvoditi samo u odredjenim centrima koji su prikladno opremljeni, uz iskusne operatere u laparoskopskoj tehnici.